

9 AN ECOSYSTEM APPROACH TO PROJECT IMPLEMENTATION USING AN ADAPTIVE MANAGEMENT PROCESS

9.1 Introduction

Section 7 of this BA details conservation actions that will be taken to avoid and minimize project impacts and take of the listed and candidate salmonid species and habitats found in the action area. It also addresses monitoring actions that will be taken to ensure that the proposed Project minimizes and/or avoids a take of a listed species or adverse effect on their habitat. Section 8 of this BA describes ecosystem restoration and research actions that are proposed by the Corps to be added to the proposed action. These actions were selected to complement regional initiatives already under way within the Columbia River Basin and are designed to be implemented in collaboration with regional goals. These actions will restore valuable habitat and contribute to the knowledge base necessary to advance the recovery of threatened and endangered aquatic species in the lower Columbia River ecosystem. All of these actions address indicators found in the conceptual model developed for salmonids (see Section 5).

Table 9-1 lists the Project actions that address specific conceptual model indicators. This table displays the compliance, monitoring, research, and restoration actions that the proposed Project will implement, addressing a significant portion of the indicators and, therefore, questions related to the lower Columbia River ecosystem as described in the conceptual model (see Section 5, Current System Function). Table 9-2 shows the purpose and timeline for monitoring and adaptive management actions proposed for the Project.

9.2 Adaptive Management Process

The Corps recognizes that implementation of the proposed monitoring, compliance, restoration, and research actions will be most effective using an ecosystem approach that recognizes a multiplicity of scales. This will assist the other entities in the region involved in restoring the Columbia River estuary to advance the state of knowledge for salmonid recovery, make ecosystem improvements, and conduct research in a collaborative effort. The Corps, Sponsor Ports (as long as funding involves the Ports for the Project), and the Services will be the adaptive management team and will collaborate in decision making for changes to the project. The Corps will perform the proposed actions using an adaptive management approach for the life of the Project, as described below.

Adaptive management is an iterative approach to managing ecosystems, where the methods of achieving the desired objectives are unknown or uncertain (Holling, 1978). Adaptive management is a continuous process of action based on doing, learning, sharing, and improving (BC Ministry of Forestry and USDA Forest Service) (see Figure 9-1). Adaptive management recognizes there are multiple explanations about biological processes and uncertainty. An important feature of the adaptive management approach is incorporating this uncertainty into the decision-making process. The decision process can modify the action, monitoring, or research, thereby reducing uncertainty and improving environmental management through monitoring.

The first step to adaptive management is to plan and set directions, and to determine objectives. The conceptual model can be used to establish hypotheses of connections between the proposed action and species of concern, and it provides a basis for clarifying assumptions and organizing the monitoring and adaptive management plan.

The proposed construction of the channel improvements includes a comprehensive monitoring plan (see Sections 7 and 8) that includes a range of monitoring actions. Monitoring will gather information to

evaluate predicted effects, validate assumptions, and reduce risk and uncertainty. The adaptive management and monitoring plan requires establishment of clearly stated goals, specific metrics, and management decision points. Management decision points are identified as part of the adaptive management plan. An essential component will be to evaluate whether management goals are being met and adjust actions to move closer to agreed-on goals.

9.3 Adaptive Management for the Project

The adaptive management team will consist of the Corps, the Services, and the Sponsor Ports. The team will carry forward the hierarchical structure that has functioned through this reconsultation to have equal participation from the project management level, within the management structure, and the regional executives of the three agencies and the ports. It is envisioned that this group will continue to function through the duration of the monitoring actions prescribed. The group will be the decision-making body to make modifications to project actions, compliance measures, monitoring program, research, and ecosystem restoration features.

The Corps anticipates working with the Services to further refine and develop the monitoring and adaptive management plan, including clear goals and scope.

Some aspects of the adaptive management process that will be incorporated include:

- An annual review meeting for monitoring, research, and restoration actions
- A review of compliance actions at each finding of adverse effect
- Monitoring program information available to the public
- An annual review and decision regarding monitoring, research, and restoration actions, and related compliance actions, to be conducted by the Corps, Sponsor Ports, and the Services.

9.3.1 No Effects Indicated

At each annual meeting of the AMT, monitoring, research, or restoration activities will be reviewed and evaluated. If no impact is found, and/or no new information is identified, the AMT will decide whether the action should be adjusted and continued (time/duration and scale will be reviewed). The AMT will decide on whether to stop all or part of the monitoring action, based on input from the entities conducting the field work.

Finally, the AMT will decide if the monitoring and field data collection is to be continued for an additional year, and whether it would still be appropriate to fund under this project.

9.3.2 Effects Indicated

If an impact is found, or the action is not implemented as proposed, or new information is found, the AMT has numerous options available. These options range from the project construction or operation remaining the same to stopping the project. Additionally, the AMT could decide that the restoration features should be altered or that the action should be stopped until more data are collected and assessed.

Options, in hierarchical order, follow:

- Project construction and operation remain the same.
- Project construction and operation remain the same. Restoration features are increased.

- Project construction is altered.
- Project construction is stopped until more data are collected.
- Project construction is stopped.

9.4 Conclusion

This Project will be performed using an ecosystem approach based on adaptive management. Actions associated with dredging and disposal [Section 7 (a) (2)] and ecosystem restoration and research actions [Section 7 (a) (1)] will be coordinated through the adaptive management process to ensure that the project will not jeopardize listed or proposed species or destroy or adversely modify their critical habitat.

Table 9-1 – Conceptual Model Indicators Addressed by Project Actions¹⁹

Pathway	ESA Section 7(a)(2)		ESA Section 7(a)(1)	
	Compliance Actions	Monitoring Actions	Research Actions	Restoration Actions
Habitat-Forming Processes				
Suspended Sediment				
Bedload		MA-2		
Woody Debris				
Turbidity				
Salinity		MA-1	ERA-6	
Accretion/Erosion		MA-2, MA-3		
Bathymetry		MA-1, MA-3	ERA-3	
Habitat Types				
Tidal Marsh and Swamp		MA-4	ERA-1, ERA-2	Yes ²⁰
Shallow Water and Flats	CA-8	MA-3, MA-4	ERA-1, ERA-2, ERA-3	Yes ²¹
Water Column	CA-9, CA-10		ERA-1, ERA-2	
Primary Productivity				
Light				
Nutrients				

¹⁹ References in this table to “MA-#,” “CA-#,” and “ERA-#” are to action numbers provided in Tables 7-2, 7-3, 7-5, 7-6, and 8-1.

²⁰ Location to be determined.

²¹ Location to be determined.

Pathway	ESA Section 7(a)(2)		ESA Section 7(a)(1)	
	Compliance Actions	Monitoring Actions	Research Actions	Restoration Actions
Imported Phytoplankton Production				
Resident Phytoplankton Production				
Benthic Algae Production				
Tidal Marsh Production				
Food Web				
Deposit Feeders	CA-4	CA-4		
Mobile Macroinvertebrates	CA-4			
Insects		MA-4		
Suspension/Deposit Feeders	CA-4			
Suspension Feeders		MA-4		
Tidal Marsh Macrodetritus		MA-4		
Resident Microdetritus				
Imported Microdetritus				
Growth				
Habitat Complexity	CA-4, CA-6	MA-1, MA-4		
Velocity Field		MA-1		
Bathymetry and Turbidity	CA-2, CA-3, CA-4			
Feeding Habitat Opportunity	CA-4	MA-1, MA-4		

Pathway	ESA Section 7(a)(2)		ESA Section 7(a)(1)	
	Compliance Actions	Monitoring Actions	Research Actions	Restoration Actions
Refugia	CA-6	MA-4		
Habitat-Specific Availability	CA-6	MA-4		
Survival				
Contaminants	CA-5, CA-7	MA-5	ERA-4, ERA-5	
Disease				
Suspended Solids	CA-2, CA-3			
Stranding		MA-6		
Temperature and Salinity Extremes		MA-1		
Turbidity	CA-2, CA-3			
Predation				
Entrainment	CA-1			

Table 9-2 – Monitoring and Adaptive Management Actions for the Columbia River Channel Improvements Project

	Action	ESA Section 7	Purpose for Monitoring	Time Frames for Review
	Compliance	7(a)(2)	Precautionary Anticipate emergencies Avoid and minimize effects Verify assumptions	Upon an adverse finding
Monitoring	Risk and Uncertainty Monitoring	7(a)(2)	Precautionary Anticipate emergencies Trends Advance scientific knowledge	Annual Cumulative data review
	Effects Monitoring	7(a)(2)	Precautionary Anticipate emergencies Trends Advance scientific knowledge	Annual
	Validation of Assumptions	7(a)(2)	Develop/calibration of models Research Advance scientific knowledge	Annual
	Research	7(a)(1)	Trends Collaboration with regional goals Research Advance scientific knowledge	Annual
	Restoration and Associated Monitoring	7(a)(1)	Research Trends Advance scientific knowledge	Annual

Figure 9-1: Continuous Management – Columbia River Channel Improvements Project